

# A MATHEMATICAL MODEL WITH DISTRIBUTED TIME-DELAYS FOR THE CONTROL OF THE UNEMPLOYMENT

Loredana Flavia Vesa<sup>1</sup>, Eva Kaslik<sup>2</sup>, Mihaela Neamțu<sup>3</sup>

<sup>1</sup>*Department of Mathematics, West University of Timisoara,*

<sup>2</sup>*Department of Computer Science, West University of Timisoara*

<sup>3</sup>*Department of Economics and Economic Modelling, West University of Timisoara*

*E-mail: loredana.vesa@e-uvt.ro, eva.kaslik@e-uvt.ro, mihaela.neamtu@e-uvt.ro*

## Abstract

**Keywords:** unemployment model, distributed delays, stability

**Domain:** Mathematics

**Section:** Elaboration of the doctoral thesis

### Motivation

A mathematical model with two distributed time delays describing the labor market is investigated. The main motivation constitutes the existing mathematical models that lay the ground for developing new approaches for studying unemployment by taking into account the past history of the variables under focus.

### Methodology of Research

The main theoretical focus of this paper is represented by the investigation of local and global stability properties for the unique positive equilibrium point of the system. Moreover, numerical simulations and existing theoretical tools for differential equations with infinite delays are used in exemplifying our results.

### Results and Comparison with State-of-the-art

Using the concepts from [1] the controllability of unemployment in developing countries has been studied in [2] considering three variables: number of unemployed persons, employed persons and newly created vacancies. Our goal is to analyze the interaction among the unemployed persons, employed persons and newly vacancies created by the government and the private sector in the framework of the stability theory of delay differential equations. Applying a Lyapunov functional, we further demonstrate the global asymptotic stability for the model.

### Conclusions

In our mathematical model two discrete time delays are taken into account in order to have a realistic approach in the framework of the economic process. The positivity and boundedness of solutions is proved. The local and global stability of the unique positive equilibrium point of the system is analyzed. Numerical simulations are presented in order to verify the theoretical findings.

## References

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